

UNITED STATES GOVERNMENT
MEMORANDUM

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Date: December 29, 1992

Reply To
Attn of: Chief, Engineering Evaluation Branch, AED, OET
Subject: ET Docket No. 92-298
To: Chief, Dockets Branch

Please insert the attached document into the record of the subject proceeding.


David L. Means

Attachment: Transcript - S. Hrg. 102-740

S. HRG. 102-740

**RADIO OVERSIGHT AND S. 1101 RECEIVED
THE AM RADIO IMPROVEMENT
ACT OF 1991**

JAN 4 '93

FEDERAL COMMUNICATIONS
OFFICE OF THE
SECRETARY

**HEARING
BEFORE THE
SUBCOMMITTEE ON COMMUNICATIONS
OF THE
COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE
ONE HUNDRED SECOND CONGRESS
SECOND SESSION**

MARCH 11, 1992

Printed for the use of the Committee on Commerce, Science, and Transportation



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public.

First, with regard to the duopoly rules—which prohibits any one entity from own-
ing two broadcast stations of the same type in the same market—economic incen-
tives for broadcasters remain constant regardless of the broadcaster's identity or
other media interests. Broadcasters will strive to maximize profits by attracting the
largest possible audience share.

An owner with two or more broadcast stations in the same market will try to at-
tract different segments of the total local audience—he will not compete against
himself by offering the same or similar "voice" or product on different stations in
the same market. Thus, owners of more than one station in a market will offer a
greater diversity of voices, programs, formats and viewpoints.

Second, with regard to the national ownership limits—which restrict ownership
to no more than 12 stations in each service (AM, FM, And TV)—confer a significant
competitive advantage on group owners who hold licenses in large markets.

A new group owner needs to have the ability to own a larger number of stations
in smaller markets to reach the same number of households as, say, ABC, CBS, or
NBC. Thus, the "12-12-12" restriction works to limit market entry by new competi-
tors and frustrate the development of new broadcast networks that could enhance
diversity—afterall, it was only after the FCC raised the limits from 7 to 12 that
FOX developed as the fourth network.

But, more specifically, with regard to the radio industry, it remains an extremely
fragmented industry. DOJ guidelines say the threshold of minimal industry con-
centration is reached when an industry has 10 equally sized firms—radio nation-
wide has roughly 10,000. Moreover, at only 7 percent of total advertising dollars,
radio today is a small fragmented fish in a vast media pond.

I look forward to the testimony from Chairman Sikes. I applaud his leadership
in the face of tough opposition from many here on the Hill.

Thank you, again Mr. Chairman.

Senator FORD. Senator Pressler.

OPENING STATEMENT OF SENATOR PRESSLER

Senator PRESSLER. Thank you. First of all, I want to commend
Mr. Sikes for his personal interest in this matter and thank you
very much for your fine statement.

Let me read to you from the letter I received from Winter, SD,
a smaller town from Steve Clark the president of the radio station
there, just very briefly, and this is in the form of a question to get
your response.

I think this points out—he says in this letter to me:

I have contacted about 30 business people recently, and the only place they have
an AM stereo radio was in their car, and that was only about 10 of them. Very few,
if any, have AM stereo receivers in their home because the FCC declined to select
an AM stereo standard. If you were to lay any blame on any one person it would
have to be the FCC and its inability to set a standard. This could have kept AM
radio more competitive with the FM market. AM radio is not dead in our area, but
your bill will help bring AM stereo to more stations in South Dakota, most certainly.

Would you, generally speaking, agree with that statement, based
on what you know?

Mr. SIKES. Generally speaking I would agree with that state-
ment. There are two historical points here, one occurred, as I re-
call, sometime in the 1960's when then a seven-person Commission
voted 5 to 2 not to develop the technical rules for AM to become
stereo. The Commission majority said at that time, AM has all the
listeners, we do not need to give it a stereo opportunity and there-
fore the technical rules were not developed. That was terribly
shortsighted because if you keep, as we know now certainly in
audio and video, one segment at lower quality than a developing
segment, then you are going to hurt it and hurt it bad.

I think the other mistake was in 1982 when an AM stereo stand-
ard was not set—although I should say that one was set by the
FCC but then the industry was very angry because certain parts

of the industry thought the wrong standard was set, so the FCC pulled back and said, all right, we are not going to set a standard. I probably would have seen that through and would have set an AM stereo standard at that point.

Now I think the problem is that the AM segment of the industry is capital poor and cannot afford it. I converted an AM station in Springfield, MO, to stereo, and it cost about \$30,000 to do it. I do not think very many AM broadcasters have \$30,000 and you can do it for less by the way, but it is still going to cost you, I think \$15,000 as a practical matter.

I do not think very many have that kind of money and what they do is they make the investment and then they have to depend on a lot of their fellow or sister AM owners around the country to do so the critical mass is attained, because it is only when critical mass is attained that the receiver universe grows, that is the AM stereo receiver universe, and it is only when that universe grows that AM stereo makes any difference.

Plus the fact, and let me add, not to complicate this unduly, but because the AM medium got crowded by shoehorning in more and more stations, there is an awful lot of interference in the AM medium, a step we are trying—now—to reduce. The interference on AM today has one wag in the industry to say that AM stereo is just static on two channels.

Senator PRESSLER. Mr. Sikes, I note in your testimony that at the time of the FCC's failure to set an AM stereo standard you would have supported my legislation, S. 1101.

Mr. SIKES. That is right.

Senator PRESSLER. But you now feel such action may not help broadcasters. What is the worst case scenario for broadcasters if S. 1101 becomes law and in 120 days the FCC decides on a national AM stereo standard?

Mr. SIKES. In my view, it would not hurt things. But my view is also it would not help things, and it would result in our doing work that I do not think would be helpful, but I do not think it would hurt.

Senator PRESSLER. I guess as you have pointed out, when you were head of the NTIA you issued a report that explained broadcasters are reluctant to make an investment in AM stereo for fear of investing in the wrong system and the lack of AM stereo receivers as you pointed out. Manufacturers in turn will not produce stereo receivers because of a lack of AM stereo use by broadcasters.

The NTIA report said FCC failure to enact a national AM stereo standard has resulted in a circle of doubt. Do you believe that this circle of doubt still remains and would this legislation end this cycle?

Mr. SIKES. I think that a report was done in 1986 as I recall, and I think that there was much more doubt then about which system might prevail. I do not think there is any doubt anymore. The Motorola system is the only one that is being used by our survey. There are not any receivers being made for any alternative systems, so it is only the C-QUAM, Motorola system that receivers can receive, and there have been, I think six or seven countries that have chosen the Motorola standard, most recently Japan.

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Senator PRESSLER. Well, speaking of Japan, one obstacle for AM development is the foreign manufacturers in making AM-capable radio receivers. Do you think the recent decision by Japan to establish a national AM stereo standard, combined with a similar action by the United States, would encourage greater production of AM stereo capable radios?

Mr. SIKES. I do not know. I really do not. One of the things that is kind of a looming development is digital audio broadcasting, doing broadcasting in digital sound. A lot of people believe that will be the next investment spurt in radio. I do not know. I would hope that something would happen, because it clearly would improve AM if Japan takes off on AM stereo, but I just cannot comment on whether that is likely to happen.

Senator PRESSLER. Thank you, Mr. Chairman. I have several letters from South Dakota radio stations and citizens analyzing this problem and reacting to this legislation. I would like to insert those letters into the record.

Senator FORD. Without objection, so ordered.
[The information referred to follows:]

LETTER FROM GARY J. SHAPIRO, GROUP VICE PRESIDENT, CONSUMER ELECTRONICS GROUP, TO SENATOR PRESSLER

MARCH 2, 1992.

The Honorable LARRY PRESSLER,
U.S. Senate,
Washington, DC 20510

DEAR SENATOR PRESSLER: The Consumer Electronics Group of the Electronic Industries Association ("EIA/CEG") wishes to express its support for your effort, as reflected in S. 1101, to require the Federal Communications Commission to designate a national standard for the transmission of AM stereo broadcasting.

EIA/CEG, as you know, represents the nation's consumer electronics industry. Our members manufacture and sell a wide variety of electronic devices, including televisions, VCRs, personal computers, telephones, and radio receivers. We represent most of the major manufacturers of the AM radios used in the United States today.

EIA/CEG has demonstrated a strong commitment to the preservation and revival of AM broadcasting. A joint engineering committee formed with the National Association of Broadcasters ("NAB")—the National Radio Systems Committee—has developed important changes in the technical characteristics of broadcast signals and the corresponding reception equipment. EIA and NAB have also cosponsored a voluntary AM receiver certification mark program, using the label "AMax," which is expected to stimulate consumer awareness of AM and to increase demand for higher quality AM receivers. EIA/CEG has also participated, through oral and written testimony, in FCC proceedings addressing various issues relating to improvement of the AM radio band.

There is one area in which efforts to rejuvenate AM radio have stagnated, and corrective legislation may be necessary. As you know, few AM radio broadcasters choose to broadcast in stereo, and correspondingly few AM radio receivers possess the capability to receive AM stereo broadcasts. Most parties agree that the reason for this is that the Federal Communications Commission failed to select a single broadcast standard for AM stereo. As the National Telecommunications and Information Administration explained in a report issued five years ago this month, broadcasters are hesitant to invest in AM stereo in part because of fear of choosing the wrong system and in part because of the lack of receivers with stereo reception capability, while manufacturers are reluctant to produce stereo receivers because of weak consumer demand (which is itself due to limited broadcaster use of stereo), and the result is a "circle of doubt." NTIA, *AM Stereo and the Future of AM Radio*, at iii-iv (February 1987). Half a decade later, the "circle of doubt" remains unbroken.

Your bill is intended to remedy that problem. It quite properly addresses itself to the broadcast side of the equation (EIA/CEG would strongly oppose any legislation which sought to impose specific AM stereo reception capability in receivers). It

seeks to break the circle of doubt by settling, once and for all, which AM broadcast standard will be used by United States radio stations. In so doing, it would eliminate the greatest impediment to the enjoyment of AM stereo by consumers and complement other industry and FCC efforts to revitalize AM radio broadcasting.

EIA/CEG supports your proposal and pledges its support to help insure that this legislation is enacted into law this Congress.

Sincerely yours,

GARY J. SHAPIRO,
Group Vice President, Consumer Electronics Group.

LETTER FROM STEVE CLARK, PRESIDENT, KYWR AM-FM, WINNER, SD, TO SENATOR PRESSLER

NOVEMBER 4, 1991.

LARRY PRESSLER,
U.S. Senate,
Washington, DC 20510

GOOD MORNING SENATOR PRESSLER, I am in receipt of your letter concerning Senate Bill 1101, re: the AM Radio Improvement Act. I am in full support of your efforts and meant to contact you earlier concerning your authoring this bill. It's definitely a move in the right direction and is something that should have been done the minute AM stereo hit the market. A lot of stations in rural areas have opted not to go AM stereo simply because the radios aren't in the marketplace.

I contacted about 30 business people recently and the only place they have an AM stereo radio was in their car and that was only about 10 of them. Very few if any have AM stereo receivers in their home because the FCC declined to select an AM stereo standard. If you were to lay any blame on any one person it would have to be the FCC and its inability to set a standard. This could have kept AM radio more competitive with the FM market. AM radio isn't dead in our areas but your bill will help bring AM stereo to more stations in South Dakota most certainly.

Our problem is our AM is a daytime station with authority recently to operate at 146 watts at night which hardly gets outside the Winner city limits. Our daytime authority is 5,000 watts. There is no reason we couldn't broadcast at least at 500 to a 1,000 at night, our nearest interference to any station is in southern Kansas! And the crossover would be somewhere in central Nebraska where no one would listen to either us or the Garden City, KS, station! We have a large listening audience within 80 miles of Winner that have no viable night time AM service from anyone except WNAX and that is regional, not local. I would pursue something with the FCC but don't know who to begin with, perhaps you have some suggestions. Our AM station is also stereo already if we were willing to spend the extra \$20,000 to make it happen, if we could get more power at night and your bill is passed we would be willing to go through with our stereo modification.

If I can be of any assistance please let me know and again thanks as always for your dedication and interest in South Dakota and especially the less populated areas of our State.

Sincerely,

STEVE CLARK,
President, KWYR AM-FM.

LETTER FROM STEVE KAISER, OWNER/MANAGER, KQKD-AM, REDFIELD, SD, TO SENATOR PRESSLER

NOVEMBER 4, 1991.

The Honorable Senator LARRY PRESSLER,
U.S. Senate,
Washington, DC 20510

DEAR SENATOR PRESSLER: Thanks for your letter of October 18. I'm in full support of your legislation, S. 1101, to mandate the Federal Communications Commission to select a system for broadcasting AM in stereo. Both Television and FM broadcast with a system approved by the FCC. It's ludicrous for the commission to insist that the decision be left to the marketplace.

It's obvious that much of the decline of AM broadcasting has come as the result of the lack of an endorsed AM stereo system—by the US government.

If the Congress really wanted to help AM broadcasting it would not only enact your provision for selection of a stereo system, but would also mandate that all re-

ceivers sold to move AM broadcast it would be a consumers can Manufacturers. That will of other media help from consumers Thanks for of your legislation Sincerely

WASHINGTON state of South require the FCC If approved, AM stereo standard with Although the ISB system, the strongest content The C-QUAL in AM stereo. example of the

"One only need here. The marketplace transition will provide to avoid falling In 1981, the better left to the not been kind the band's influence Today, only 30 Pressler put emerge from the petitioning citizens he said. "It is taking action n

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At a meeting agreed with the in the U.S. He ready demonstration Sikes said the considered, he inaction may be opening the issue

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GARY J. SHAPIRO,
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NOVEMBER 4, 1991.

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STEVE CLARK,
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NOVEMBER 4, 1991.

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ceivers sold that capture FM in stereo, also capture AM in stereo. This would truly
 move AM broadcasters along to convert their stations to stereo transmission. I feel
 it would be a waste of my investment to install stereo transmission equipment until
 consumers can receive the signals.

Manufacturers say they are waiting for the public to start requesting such receiv-
 ers. That will never happen since FM already provides the service along with a host
 of other media. AM is 20 years behind and it will not catch up without mandated
 help from congress.

Thanks for your efforts on our behalf and please keep me informed of the status
 of your legislation.

Sincerely yours,

STEVE KAISER,
Owner/Manager.

[Radio World, July 24, 1991]

NEW AM STEREO BILL INTRODUCED

(by John Gatski)

WASHINGTON—Citing a need to boost AM quality in rural areas such as his home
 state of South Dakota, Sen. Larry Pressler (R-S.D.) has proposed a bill that would
 require the FCC to select an AM stereo standard.

If approved, the bill would require the FCC to initiate a rulemaking to select an
 AM stereo standard within 60 days. The Commission would then have to enact the
 standard within 180 days.

Although the bill does not specify either Motorola's C-QUAM or Leonard Kahn's
 ISB system, Pressler's recent statement on the bill indicated that C-QUAM is the
 strongest contender for selection as a standard.

The C-QUAM system is used by the majority of those U.S. stations that broadcast
 in AM stereo. Pressler also pointed to Japan's recent selection of C-QUAM as an
 example of the Motorola system's popularity.

DO AS JAPAN DOES

"One only needs to look at Japan to understand how much this legislation is need-
 ed here. The Post Ministry of Japan decided to abandon its policy of allowing the
 marketplace to settle on one system and adopt * * * Motorola's C-QUAM. This deci-
 sion will provide uniform AM stereo throughout Japan. America needs to act now
 to avoid falling further behind in the development of AM system."

In 1981, the FCC declined to select an AM stereo standard, believing that it was
 better left to the marketplace. According to industry analysts, the marketplace has
 not been kind to AM stereo for several reasons, including the FCC's hands-off policy,
 the band's inferior fidelity when compared to FM, and lack of AM stereo receivers.
 Today, only 30 percent of AMs are broadcasting in stereo.

Pressler put heavy emphasis on the FCC's decision to let an AM stereo standard
 emerge from the marketplace. "The inability of the market to decide between com-
 peting citizens has left consumers, equipment producers and broadcasters in limbo,"
 he said. "It is important for the FCC to prevent further confusion in this area by
 taking action now!"

The senator stressed that rural states such as South Dakota have numerous AMs,
 and these stations stick with the band because of its greater transmission distance.

"The thousands of farmers and ranchers in rural South Dakota, many of whom
 are without AM stereo, want to receive better quality sound. AM stereo is the solu-
 tion because it can broadcast greater distances than FM stereo!"

At a meeting with members of the press June 21, FCC Chairman Al Sikes dis-
 agreed with the notion that the lack of a standard has left AM stereo at a standstill
 in the U.S. He maintained that broadcasters and receiver manufacturers have al-
 ready demonstrated a preference for one system over the other.

Sikes said that if he had been on the Commission when AM stereo was first being
 considered, he "would have moved to set a standard," acknowledging that the FCC's
 inaction may have "set back the cause of AM stereo." However, he added that re-
 opening the issue "would be to raise a question where no question today exists."

HERE WE GO AGAIN

The Pressler bill was introduced with little fanfare and discussion (the NAB de-
 clined to even comment on the matter). Legislation has been introduced in the past

to require an AM stereo standard, but such bills have usually gotten lost among other, higher-profile legislation.

One bill, introduced by Rep. Matthew Rinaldo in 1989 would have required AM stereo in FM stereo-equipped receivers; but again, the bill did not specify which system should be the standard.

A spokesman for Rinaldo's office said the bill has not been resurrected in Congress because stereo is likely to be addressed in the FCC's pending AM improvement package.

The Commission's AM action will take into account a multitude of problems that AM has faced in recent years, not just lack of a stereo standard, according to the FCC.

Those problems include bandcrowding—which has led to narrower receiver bandwidths and poorer sound quality—as well as continuing problems with electrical interference and a public perception that the band is inherently inferior to FM.

Some AM stations in Pressler's home state said even if a standard is selected, it may be a long time before they benefit from a move to stereo.

Acknowledging the better quality of AM stereo, Jim Lowe, GM at KSOO in Sioux Falls, South Dakota, tempered his optimism with economic reality. He said stations still have to purchase stereo equipment taking a large bite out of a station that may be barely surviving.

The overall economic health of AMs is not as good as FM's, according to NAB surveys. Fewer of them turn a profit, and are therefore less likely than their FM counterparts to invest in new equipment immediately.

Lowe also pointed out that in rural, less affluent areas such as South Dakota, AM listeners are less likely to plunk down extra money for an AM stereo-equipped receiver or drive an expensive car that has one.

AM stereo equipment manufacturers, who were not overtly optimistic because similar legislation has been introduced before, said they would like to see the U.S. finally adopt a standard.

"We are the only country (that has taken a position on AM stereo) to take a free market approach, and we wonder why it has failed," Broadcast Electronics' Manager of Product Management Bill Harland said.

[Radio World, July 24, 1991]

OPINION—EMBRACING AM STEREO

AM stereo has a new champion in Congress, whose efforts may finally force the FCC to take an official stand on the technology.

South Dakota Senator Pressler recently introduced a bill that would require the FCC to select an AM stereo standard within 180 days of approval of the legislation.

Pressler's reasoning for proposing the bill is simple: For his constituents, the AM band is a vital link with the world beyond their farms, and improved sound quality in AM is still significant to them.

While that point is not lost on FCC Chairman Al Sikes, his off-the-cuff remarks about AM stereo have shown that he feels an FCC-approved standard is unnecessary.

According to Sikes—who as administrator of the National Telecommunications and Information Administration decreed that AM stereo already had a "de facto" standard—manufacturers and broadcasters have stated their preference for one of the two competing systems.

True, most of those broadcasters willing to go out on a limb to support a new technology have chosen Motorola's C-QUAM over Kahn's ISB system. But those pioneers represent a mere handful of the total number of AM broadcasters.

The remaining stations are not fence-sitting because they see no benefit in AM stereo. To the contrary, many more would probably adopt the technology if they were certain that the direction they chose was federally mandated.

The fact is, implementing an AM stereo system is a costly proposition for broadcasters who are already suffering from declining revenues; without a standard, the financial risk may seem too great.

As for receiver manufacturers, it is true that a few companies have introduced AM stereo radios, most of which decode only the C-QUAM system. But these firms will not spend the promotional dollars needed to launch an effective marketing campaign for a technology that still has a vocal competitor on the sidelines.

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Broadcasters are still interested in AM stereo. But it will take more than a minor-
ity to make AM stereo a success, and the majority are looking to the FCC for an
official statement.

It's time the U.S. joined the ranks of the other nations that have backed a single
standard. AM stereo may not save the band, but without a national standard,
broadcasters are seeing a potential enhancement of the AM service slip through
their fingers.

Senator FORD. Does the Senator want those included in the
record or just printed? We could save money for the record if we
just had them included in the record, but not printed.

Senator PRESSLER. There are only about 5 or 6 pages here. What
is the usual procedure?

Senator FORD. Well, I just asked. I wanted to be sure. Some want
them in, some do not. Others, we just have it for the file, for the
record, in case somebody needs to make a copy of it.

Senator PRESSLER. Well, let me talk it over with you then.

Senator FORD. That would be fine. Mr. Chairman, small stations,
as you know very well and have experienced probably, do not have
money, particularly to buy more stations. Small stations will be
bought by big groups and big group owners.

How do we protect, and I would follow up a little bit on Senator
Burns' question, how do we protect the small operator who wants
to go in and he gets squeezed out or does not have a chance to
enter the market? We talk about competition, but yet the good old
American way, if you can make it and you can buy them out, let
them go.

So, there is a balance and I am not sure you can get to the bal-
ance under these circumstances.

Mr. SIKES. I believe that in the largest markets where the big
group owners tend to concentrate, where the Cap Cities-ABC's and
the Westinghouses and the CBS's are, I think there will be efforts
to improve their position.

Senator FORD. You say efforts to improve their position to buy
more stations?

Mr. SIKES. Exactly. But generally speaking, it is fairly big opera-
tors that are in those larger markets. Now you get to small mar-
kets in Kentucky, for example, and I think you will find people that
by anybody's estimation are small operators that in fact will have
money to add another station to their combination and will do so.
And those stations do not cost a lot.

In fact, on the AM side, if you could add a station, you probably
would not have to spend much money to do it. Now, there are ex-
ceptions to that. You have got the AM clear-channel stations, but
those are in the big cities.

Senator FORD. 50,000 watts on the air everywhere.

Mr. SIKES. That is right.

Senator FORD. It is my understanding that the current selling
prices of stations are approximately the same as they were in the
1970's; stations selling around I guess, what, seven to eight times
cashflow, despite the recession.

Now I recognize that prices were much higher in the 1980's, but
the 1980's prices were higher for virtually all industries then. What
is the projected growth of the radio industry in the 1990's?

Mr. Novik, what would be the impact for AM broadcasters of increased penetration of AM stereo technology?

Mr. NOVIK. First, Senator Pressler, let me thank you for your interest in AM improvement and for introducing the bill. I think the bill is important and overdue. The concern I have, and in this I would echo Chairman Sikes' comments earlier this morning, is that this is a measure that has to be coordinated with the manufacturers of receivers.

We are faced with the chicken and the egg. We are going to be asking AM broadcasters to invest some very dear dollars at a point where they will say, but there are not enough receivers in the markets. From the point of view of the receivers, they are saying well, why should we be making radios if there are not enough stations broadcasting in AM stereo?

I would suggest, Senator, that in order for the bill to succeed, there has to be some common date where transmitters and receivers get on the air, take effect in common, or I do not think it is going to happen.

Senator PRESSLER. Well, I guess one obstacle for AM stereo development is the absence of interest by foreign manufacturers in making AM stereo-capable radio receivers. Do you agree that Japan's recent decision to establish a national AM stereo standard combined with a similar action by the United States would encourage greater production of AM stereo-capable radios?

Mr. NOVIK. I would think that that is accurate, and it is a very hopeful sign, sir.

Senator PRESSLER. Many of the questions here have been covered by the testimony. I think the testimony was excellent by all of you, and rather than repeat portions of it I think we have covered it, and so I thank this panel very much. There will be some additional questions for the record from myself and other Senators.

I thank you very, very much for excellent testimony this morning. I now call forth panel 3, Mr. Tim Graham, director of engineering, Sencore Co., Sioux Falls, SD, and Mr. Leonard Kahn, president of Kahn Communications.

I guess Mr. Kahn has been delayed on the train, so we will put his testimony in the record. Mr. Tim Graham.

STATEMENT OF TIM GRAHAM, DIRECTOR OF ENGINEERING, SENCORE CO., SIOUX FALLS, SD

Mr. GRAHAM. Thank you. First off, I would like to introduce my family that were able to come along with me on vacation, if they could maybe just wave. My wife of 17 years, Pam, and my daughter Heather, who is celebrating her 15th birthday today, going on 20, I might add, and my other daughter, Erica—she is 12—and then my son Matthew, who is 8.

Senator PRESSLER. And I take it you all live in Hartford, SD.

Mr. GRAHAM. That is right.

I am pleased to represent Sencore on our views in support of your bill, S. 1101. Sencore is a 40-year-old-plus company based in Sioux Falls, SD. Our product offering consists of test equipment and analyzing equipment for use by service personnel in the areas of video, audio, communications, and computer repair. Because of the nature of our business we rely on standards for setting good/

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In the past, the Federal Communications Commission has adopted standards to assure common signal characteristics and the quality thereof throughout the industry. Examples of these standards are TV signals using NTSC, FM stereo radio, TV stereo using MTS, and a future promise of high definition television, HDTV.

These standards allow test equipment manufacturers, broadcast equipment manufacturers, and consumer electronic manufacturers to focus on one technology without any doubt or question as to its characteristics. It also eliminates any possible hesitation by the consumer to purchase equipment, wondering if the technology is the correct choice or if it will be around for any length of time.

Sencore knowingly took a risk by developing an analyzer for AM stereo/FM stereo radios without having a defined standard for AM stereo. Our previous AM/FM analyzer used old technology, and we were repeatedly being asked for an update by our customer base.

One of the update features asked for was the addition of AM stereo. We struggled with this decision, knowing it was a risk without having a standard. The final outcome is an analyzer that does include AM stereo. One of Sencore's basic philosophies is to provide the service technician with everything required to do the job. Thus, the reason for adding AM stereo. When a radio or tuner comes in for repair, he now can service both AM stereo and FM stereo problems with one fully integrated unit costing less than one- that of separate competitive instruments on the market.

Initial movement of our analyzer was strong and appeared to be a typical moving unit for Sencore. However, movement has literally ceased to exist, caused by the lack of a standard in radio manufacturers pulling back on AM stereo. Sencore is currently sitting on about 2.5 million dollars' worth of inventory with no future in sight, unless something is done to improve the quality of AM radio.

During a recent consumers electronics show we again met with several radio manufacturers to promote our analyzer and to get a feel of the market. Their indication to us is that they have removed AM stereo from their radios and will not reintroduce AM stereo until a standard is set. The lack of a standard is holding back any possible growth or technology advancement of AM radio. This has also made the continued availability of our analyzer questionable, as without AM stereo radios there is no market for our product.

Senator Pressler has already mentioned the lack of quality radio in rural areas of South Dakota. According to our latest information, much of the area west of the Mississippi does not have AM stereo available to them. FM stereo is high quality radio and is available in some areas, but due to its smaller coverage area does not provide as practical a solution as AM stereo does with its larger range capability.

We believe the first step in improving AM radio quality is to set a standard for AM stereo. This standard will give direction and focus to test equipment manufacturers, radio manufacturers, and broadcast equipment manufacturers. It will also give consumers the confidence they need to purchase a technology they can be sure of.

Japan has recently done this by settling on an AM standard, giving them the focus for improved AM radio reception. Several other companies have already settled on an AM standard as well. We believe this legislation is long overdue and needs to be enacted now. Sencore is in full support of this bill and wishes its approval.

Thank you.

Senator PRESSLER. Well, Tim, I welcome you here. I know you have worked for Sencore for 17 years or mentioned you have been married for 17 years. Sencore is an independent electronics manufacturer has a direct interest in the legislation we are considering today. You come from Hartford which is just a few miles away from my home town of Humboldt. Let me ask you a few questions. Mr. Graham, how do AM stereo signals differ from regular AM signals.

Mr. GRAHAM. Well, living in South Dakota we have a limited number of AM stereo stations and I have one automobile that does have AM stereo available to it, with the one station in the area that is by far our favorite choice. It has a much fuller sound, a better sound, just a higher quality reception all around.

Senator PRESSLER. Would rural areas receive higher quality radio service?

Mr. GRAHAM. We believe so. It is a long trip between Sioux Falls and Rapid City without a real good AM quality signal.

Senator PRESSLER. How would your manufacturing business be affected if the FCC adopted a national AM stereo standard?

Mr. GRAHAM. We believe as indicated by the radio manufacturers that we have talked to, by setting a standard they would again reintroduce AM stereo radios, with AM stereo radios there is a repair market then for our analyzer equipment.

Senator PRESSLER. Some contend that broadcasters who are interested in AM stereo should be willing to make a large investment in a gamble between two competing systems. In your discussions with broadcasters interested in the purchase of AM stereo equipment, do you find many broadcasters interested in making this gamble?

Mr. GRAHAM. No. Actually not. They are concerned about the cost that it would take to upgrade to AM stereo. If we had a standard, the decision would be easy to make.

Senator PRESSLER. Some people argue that an FCC rulemaking would cause uncertainty and confusion among broadcasters about which system to purchase. Do you believe the assurance that a national AM stereo standard would give broadcasters outweighs the temporary uncertainty that could result during an FCC rulemaking?

Mr. GRAHAM. I believe so. As already stated, the Motorola system is pretty much a de facto standard. We just need to initiate it and make it a formal standard.

Senator PRESSLER. As an independent electronics manufacturer is it accurate to say you do not care which standard is adopted?

Mr. GRAHAM. I think that is quite accurate. What we are looking for are standards so we can set our good/bad limits, recreate signals, substitution signals. We did invest in the Motorola system at the time. It looked like it was going to become the standard, but no, we need a standard to set our signal characteristics by.

Senator PRESSLER explained the lack of AM stereo standard as a circle of doubt.

Mr. GRAHAM manufacturers they have indicated to reintroduce.

Senator PRESSLER has arrived. W

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Mr. KAHN. T. Motorola and industry included at the radio equipment total broadcast station the free market.

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Senator PRESSLER. Mr. Graham, a report 5 years ago by the NTIA explained that broadcasters are reluctant to make an investment in AM stereo for fear of investing in the wrong system and the lack of AM stereo receivers. Manufacturers in turn will not produce stereo receivers because of the lack of AM stereo used by broadcasters. The NTIA said FCC failure to enact national AM stereo standard has resulted in a circle of doubt. Do you believe the circle of doubt remains, with this legislation and this cycle?

Mr. GRAHAM. I believe it does remain. Just talking to the other manufacturers trying to promote our analyzer, like I mentioned they have indicated to us that without a standard they are unwilling to reintroduce AM stereo in their radios.

Senator PRESSLER. I thank you very much. I see that Mr. Kahn has arrived. We welcome you.

STATEMENT OF LEONARD R. KAHN, PRESIDENT, KAHN COMMUNICATIONS, INC., CARLE PLACE, NY

Mr. KAHN. Thank you very much.

Motorola and General Motors efforts to control the AM stereo industry included the most expensive marketing campaign ever targeted at the radio industry. Even so, Motorola's stereo transmission equipment total penetration has peaked at only 10 percent of AM broadcast stations. Therefore, their apologists now complain that the free marketplace has failed.

But it is just as much a function of the free marketplace to weed out bad or poor technology as it is to welcome new useful products. If you open up a bakery and spend a fortune advertising donuts but they are soggy and you fail, do you blame the free marketplace for your failure?

Of course not, you blame the donuts. The marketplace is just doing its job—and if you cannot take the heat, get out of the kitchen or at least stop making soggy donuts.

Even with millions of stereo receivers in GM and Chrysler cars that only provide stereo for one system, broadcasters all over the country are turning that system off. Even in your area, Senator, can anyone seriously suggest there is not something wrong with the Motorola/GM donuts? Or do we all blame our commercial failures on the American system of free enterprise.

Thus, I submit that the AM stereo marketplace has functioned superbly in rejecting the Motorola/GM stereo system, and it is time for them to face reality. We at Kahn Communications and our broadcast supporters all over the world, look forward to our turn in the AM stereo marketplace. We have modern designs for high fidelity receivers that prove AM stereo can beat FM stereo in cars and for other mobile services and also in sparsely populated areas such as in your State, Senator.

That is why we have so much support there. And we are not the only ones waiting to produce high quality AM stereo radios.

At this point it is important to say a few words about the pending litigation pertaining to AM stereo. However, you will appreciate my constraints in discussing the *Kahn v. General Motors* suit. But at least you should know that if the suit is successful, the Court can be expected to issue an injunction halting the manufacture of

GM AM stereo radios, the very radios that have blocked my system's entry to the free marketplace.

This patent infringement and tortious conduct suit was filed in 1988, and as a result of a successful appeal to the court of appeals for the Federal circuit here in Washington, it is now rapidly coming to trial. The Federal Court in the Southern District of New York has denied all motions for summary judgment and the completion of discovery is being expedited. So, we should be going to trial in the very near future.

I have pledged to broadcasters in the United States and all over the world that when I win this suit, I will introduce high-fidelity, high-technology 1990 stereo radios that will provide superb performance even in sparsely populated areas and that will allow AMers to compete well into the next century.

AM will move ahead if it is given the proper free enterprise tools. The story behind this suit is not a pleasant one—how GM and Motorola panicked when they suddenly realized that they were unable to solve the click and pop problem that brought down Magnavox and how they then decided to copy my invention and then to use my own invention to exclude me from the marketplace.

In any case, the committee should carefully study the public files of this suit before even considering AM stereo legislation.

Now, I would like to leave you with an even more positive note. There is a way to checkmate Japan, Inc., not only for AM stereo, but for all technologically based competitions. That concept can only be understood if you consider Japan's weaknesses and America's strengths and I would like to try to expand on this concept rather than going into the failings of the Motorola system during the question period, and I now believe I have about used up my time.

[The prepared statement of Mr. Kahn follows:]

PREPARED STATEMENT OF LEONARD R. KAHN

Thank you for your invitation to testify about the AM stereo marketplace.

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Now I would like to checkmate Japan competitions. That's the question period.

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A "case study" of the AM stereo competition may provide important clues as to how our country can better compete worldwide. This ten year old bare-competition demonstrates the power of technology to overcome almost any amount of marketing effort and even overcome improperly gained de facto monopolies and even de jure monopoly grants.

The AM stereo "case study" teaches that if America can use superior technology to build new and better mouse traps and protects that new technology, it should be able to counter even Japan's twenty year old reputation for building better quality products.

This raises the question of how America can restore its reputation as the world's leading innovator. I believe that this is not a difficult problem once one recognizes a genetic characteristic of almost all Americans, our ability to survive and our gutsy pioneering spirit. No matter why our forefathers left the old country, no matter which continent they came from, getting across the ocean took guts and resourcefulness. To survive with little or no money and in most cases not even knowing the language, was not for the timid. The timid stayed home.

Those who did not make the decision to leave and came over in chains, had the awesome problem of just finding a way to stay alive. And one can only guess as to the ordeals the American Indians overcame in migrating to America.

This pioneering spirit, this unwillingness to play it safe, this rebellious nature, this genetic background provides America with its greatest natural resource, citizens who are the best innovators in the world.

But if Americans are such great innovators how come the Japanese are being awarded so many U.S. patents. But such statistics ignore the question of quality. In this day when patent examiners only need a degree in science or engineering and the willingness to take the job, it is foolish to expect them to be able to understand the disclosure of a brand new technical breakthrough.

On the other hand, applications for simple (obvious) patents are easily understood. Therefore, inexperienced examiners readily allow simple patents to issue, especially if they are submitted by large, well known firms. Indeed, one might argue if such examiners understand the so-called invention, it is obvious under 35 USC 103.

On the other hand, important pioneering inventions, the ones that this country is known for and the ones that start new industries, are far beyond the comprehension of today's average examiner and therefore do not readily issue.

So, the first step in strengthening America should be to revitalize the US PTO by upping the salaries of the Examining Corps and increasing qualifications of its members. As a colleague of mine once remarked, "since Einstein left the (Swiss) Patent Office it has been all downhill." It may not take an Einstein to understand pioneer inventions, but it certainly takes more than apprentice engineers.

Of course, not every American is an inventor. Nor is every person who stayed home in the old country a mere copyist, but a far greater percentage of Americans have a rebellious intellectual pioneering spirit. And where will you find a large percentage of America's technological rebels * * * surely not at GM or Chrysler or if

they are there they must be frustrated in attempting to get someone to listen to them. Nor must they be enjoying being part of a huge structured team in Japan where their names do not even appear on the patents.

Inventors aren't team players, they are loners * * * and their big egos resist their being forced to share credit for their inventions with fellow team members. No, don't expect to find them in large firms, look for them in their own labs or in small firms where their inventions are recognized.

After you get Einstein's disciples back in the Patent Office what do you do? First of all, you do all you can to favor small companies because they are your richest source of innovation. One giant step in helping small firms is to get Uncle out of the way. Government is a natural enemy of small innovative firms, because large firms, who wish to protect the status quo, generally have an inordinate amount of influence on governments and can use this influence to stifle new technology that threatens "their" industries. If you take a poll of small and medium sized firms, up to say 100 million dollar gross, you will find they oppose "protection" from the government, it is their billion dollar competitors that want (and need) the protection!

So most large firms (there are, of course, exceptions) want standards that may sound good to the government but in most cases are really just camouflaged barriers keeping out new competition. Such firms as GM, Motorola and Chrysler have had enormous success in manipulating governments all over the world. Certainly historically we have learned that what is supposed to be good for GM isn't necessarily good for our country.

Therefore, there is more than a little truth to the public's belief that the least government is the best government.

ARE BILLION DOLLAR FIRMS VIABLE

America has, over the years, tied its future industrial plans to Detroit. Since the 1920's we have been in love with the automobile and pride ourselves that the gutsy risk takers, the Fords, the Chryslers, the Fishers, and the Olds personified the pioneering spirit. Whether or not they were right on every occasion, they were, at least, not afraid to take a chance.

While the automobile pioneers were around, Detroit could really compete. However, they are no longer with us and, unfortunately, their most compelling leader Mr. Ford left us with a legacy that has all but crippled the automotive industry. They made a deal to never allow outside inventors to interfere with "their" industry. And this worked well until the Germans and the Japanese with their strengths (skilled, highly disciplined workers) could march in with better quality and even in some cases better invented cars.

In other words, Detroit's cozy deal fell apart in the last thirty years because their monopolistic tactics didn't take into account worldwide competition. And also because they could no longer attract innovative talent to replace their founders.

But why can't the big firms outside of Detroit be efficient and well managed. Because most of them are run by management committees whose member's selfish interests are not directed to the long term success of the firm, but rather to the next quarter because of stock options, golden parachutes, etc., etc. In other words, there is a built-in basic "conflict of interest" between the short term interests of these firms' managers and the long-term interests of their powerless stockholders.

Indeed, if this country is to solve its economic problems it is imperative that we have an answer to the basic question * * * are billion dollar firms viable entities? After the entrepreneur leaves and ownership control shifts to the public, can professional managers maintain the minimum growth pattern needed for America to compete worldwide.

History provides only scant evidence as there are no billion dollar firms that have outlived their founding entrepreneurs by more than a century. (It is noteworthy that a large number of the founders were inventors.) The recent downsizing of GM, IBM, GE, Phillips and even Sony tends to favor the conclusion that such firms are not viable. Even with downsizing, two of the largest and most prestigious firms in the World (GM and IBM) are suffering downturns in their fortunes.¹

In any case, on average, billion dollar firms are not the type of firms to produce their share of high tech developments.

If the billion dollar firms cannot provide the necessary leadership, how about getting the leadership from impartial government committees. I believe you don't have to be a Senator to recognize that the track record of government officials, sitting be-

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Thank you.

Senator PRE which will be in AM broadcaster

Mr. KAHN. I ever they damr

¹As reported pg. 1 June 6, 1988 WSJ "Shrinking Giant * * * The New-Model GM Will be More Compact But More Profitable" and pg. 1 Business Sectn. Jan. 18, 1992 N.Y. Times "IBM Loss in Quarter and Year".

²"The Truth About Vandenburg, Esq. 73

hind gray metal desks, proves that this isn't the solution. If one wants further proof just investigate the efficiency of government control of the health care field that has made the most caring doctors deny their patients treatment time while they act as bookkeepers filling out endless new types of forms concocted by bureaucrats in Washington and by their counterparts in billion dollar insurance companies. Indeed the government is treating all doctors as felons while the few bad apples play the government game with teams of supporting accountants and others who know how to play that game. No wonder some of the most eminent physicians are taking early retirement.

This same Washingtonian "guilt by profession" concept has driven many honest government contractors out of the industry leaving behind large firms that also know how to play the government game. Billion dollar firms can most easily afford to play this game because when they are occasionally caught they pay the typical 10 or 15 million dollar fine out of petty cash.

No, assuredly the answer to America's problems are not to be found in Washington just as they are not to be found in Detroit.

Finally, the judicial system must be restructured so that all people, not just the billion dollar firms, can afford the price of justice. The judicial system has become so expensive as to preclude its use by individuals and medium and small firms to protect and enforce their property rights. In a recent paper in the JPOS,² patent attorney Mr. J. D. Vandenburg makes a simple (but chilling) introductory statement:

"A patent litigation might easily take anywhere from six months to ten years to complete, but most commonly lasts from two to five years. The out-of-pocket costs typically range (absent early settlement) from \$100,000 to \$1,000,000, but average about \$350,000."

Faced with such "out-of-pocket" expenses, most, if not all, prudent inventors and businessmen managing small to medium size firms recognize they can't afford to protect their patent property. And, if the infringer is a large litigious firm the out-of-pocket cost of prosecuting will far exceed those figures. Indeed, I can personally testify that competent patent law firms do not guarantee a maximum ceiling in out-of-pocket expenses no matter what percentage is offered as a contingent fee. Thus, all but the most affluent owners of intellectual property are defenseless when a large firm decides to violate their patent property rights.

But this problem is not limited to owners of intellectual property. It is true of all types of business litigation. For all practical purposes the courts have been slammed shut to all but a handful of superfirms who, when challenged by smaller sized firms, use the judicial system to further strengthen themselves in a forum where only they can prevail.

The main area of such unilateral use of the courts is in the discovery process. Since discovery represents the most expensive phase of litigation, the Congress should take a careful look at the entire discovery process to reduce the tilting of the scales of justice. Recently adopted changes in the Federal Rules of Civil Procedure should alleviate this problem, but there is so far to go to restore matters to a point where the average small firm inventor can protect himself that further changes will be required.

CONCLUSION

In conclusion, I believe that America can reclaim its industrial leadership role if all branches of government help American innovators do their job by getting out of the way except for performing its job of protecting property rights, including the intellectual property rights of all innovative firms.

Thus, I support most FCC efforts to deregulate and I oppose Senate bill S. 1101 or any other bill that attempts to prop up failed technology and repeal the laws of physics.

Thank you.

Senator PRESSLER. Thank you very much for your testimony which will be included in the record. Let me ask you do you believe AM broadcasters should gamble on AM stereo?

Mr. KAHN. I believe anybody in business should gamble on whatever they damn please.

²"The Truth About Patent Litigation for Patent Owners Contemplating Suit" John D. Vandenburg, Esq. 73 JPOS 301.

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Senator PRESSLER. Mr. Kahn, you realize we are not advocating one system over another. Your system could very well be chosen by the FCC.

Mr. KAHN. Senator, I am the most realistic guy you have ever run into. When you have 50 lobbyists, as I have been told Motorola has working over the FCC I do not stand a chance and I know it and the broadcasters that support me know it and if you want to hear some angry broadcasters, bring them in, especially former Motorola users who have dropped their system because it does not work.

I said I did not want to discuss the reasons why the Motorola system does not work, but one thing you should know, people actually, God's honest truth, and I will get you letters from engineers, and their wives, who are not listening to the technicality of it, who will tell you that they have gotten nauseous from Motorola/GM stereo and they have gotten nauseous because it is an effect akin to platform, excuse me to seasickness.

This phenomenon was studied even by theorists in China who wrote theoretical proofs confirming measurements they made on the Motorola-General Motors system. So, how is that going to work? This motion sickness problem only affects 10 percent of listeners. By the way, I do not get sick, but I take a 25-foot boat through inlets, so I do not get sick. I do not like the sound, and I know a former airline pilot in Baltimore, I am under oath, or maybe I am not, but I am willing to swear to it, who gets sick on Motorola/GM stereo regularly, and he was a former airline pilot.

To tell you the complete truth, he used to get sick in the planes, too, but the money was so good he learned to fly away from storms pretty damn quick. Free enterprise at work.

Senator PRESSLER. We thank you very much. If you have any additional letters or materials that you wish to submit, we will place them in the record. We thank you for your difficult trip here today and we wish you well.

Mr. KAHN. Thank you, sir.

Senator PRESSLER. I believe we have heard all of the witnesses, unless some more trains are coming this morning. I thought the shuttle beats the train all the time. I guess it did not this morning, but with that I am going to thank everyone and thank the staff and adjourn this meeting.

[Whereupon, at 12 noon, the hearing was adjourned.]

Senator Pressler
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APPENDIX

PREPARED STATEMENT OF SENCORE

Senator Pressler and members of the committee: I am pleased to represent Sencore on our views and support of bill S. 1101. Sencore is a 40-year-old-plus company based in Sioux Falls, South Dakota. Our product offering consists of test equipment and analyzing equipment for use by service personnel in the areas of video, audio, communications, and computer repair. Because of the nature of our business, we rely on standards for setting good/bad limits, analyzing signal characteristics, creating substitution signals, etc.

In the past, the Federal Communications Commission has adopted standards to assure common signal characteristics, and the quality thereof, throughout the industry. Examples of these standards are TV signals using NTSC, FM Stereo radio, TV Stereo using MTS, and the future promise of High Definition Television (HDTV). These standards allow test equipment manufacturers, broadcast equipment manufacturers, and consumer equipment manufacturers to focus on one technology without any doubt or question as to its characteristics. It also eliminates any possible hesitation by the consumer to purchase equipment wondering if the technology is the correct choice, or if it will be around for any length of time.

Sencore knowingly took a risk, by developing an analyzer for AM Stereo/FM Stereo radios without having a defined standard for AM Stereo. Our previous AM/FM Analyzer used old technology, and we were repeatedly being asked for an update by our customer base. One of the update features asked for, was the addition of AM Stereo. We struggled with this decision, knowing it was a risk without having a standard. The final outcome is an analyzer that does include AM Stereo. One of Sencore's basic philosophies is to provide the service technician with everything required to do the job; thus, the reason for adding AM Stereo. When a radio or tuner comes in for repair, he now can service both AM Stereo and FM Stereo problems with one fully integrated unit, costing less than half that of separate competitive instruments on the market. Initial movement of this analyzer was strong and appeared to be a typical "moving unit" for Sencore. However, movement has literally ceased to exist, caused by the lack of a standard and radio manufacturers pulling back on AM Stereo. Sencore is currently sitting on \$2.5 million of inventory with no future in sight—unless something is done to improve the quality of AM radio.

During a recent Consumers Electronic Show (CES), we again met with several radio manufacturers to promote our analyzer and to get a feel of the market. Their indication to us is that they have removed AM Stereo from their radios, and will not reintroduce AM Stereo until a standard is set. The lack of a standard is holding back any possible growth or technology advancement of AM radio. This has also made the continued availability of our analyzer questionable, as without AM Stereo radios, there is no market for our product.

Senator Pressler has already mentioned the lack of quality radio in rural areas of South Dakota. According to our latest information, much of the area west of the Mississippi does not have AM Stereo available to them. FM Stereo is high-quality radio and is available in some areas; but due to its smaller coverage area, it doesn't provide as practical a solution as AM Stereo does, with its larger range capability.

We believe the first step in improving AM radio quality is to set a standard for AM Stereo. This standard will give direction and focus to test equipment manufacturers, radio manufacturers, and broadcast equipment manufacturers. It will also give consumers the confidence they need to purchase a technology they can be sure of. Japan has recently done this by settling on an AM standard, giving them the focus needed for improved AM radio reception. Several other countries have already settled on an AM Stereo standard as well.

This legislation is long overdue, and needs to be enacted now. Sencore is in full support of this bill and wishes its approval.

Thank you.

industry." NABOB submits that the solution is not to destroy diversity, but to save diversity, by preserving the stations which provide it.
Thank you.

PREPARED STATEMENT OF BRUCE LADD, VICE PRESIDENT OF GOVERNMENT AFFAIRS
AND GOVERNMENT RELATIONS, MOTOROLA, INC.

1. BACKGROUND AND OVERVIEW

AM improvement through stereo

Motorola is most pleased to respond with its comments regarding AM Stereo. Motorola has been a major participant and contributor in the AM improvement areas of AM stereo, the NRSC¹ pre-emphasis standard, and the NRSC AM RE emissions mask which has been consequently adopted into law by the FCC. In addition, Motorola has been a past manufacturer of AM broadcast receivers and is presently a manufacturer of AM stereo broadcast equipment as well as one of the leading manufacturers of integrated circuits. Motorola has shipped about 24 million AM stereo decoder integrated circuits to date and offers a complete family of AM stereo integrated circuits covering all radio receiver types. Finally, Motorola has worked directly with many manufacturers on the design of AM stereo receivers.

The central focus of these comments is on AM stereo with the major emphasis on receivers. Many improvements accrue to AM radios as a result of the stereo feature. These improvements will be discussed in Section 2. Related subjects are introduced as required.

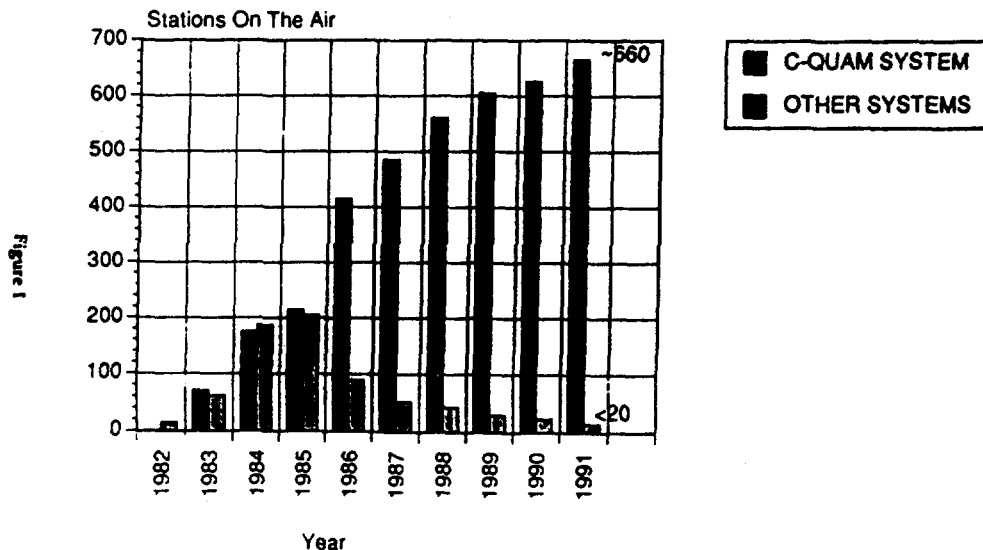
1.0. AM stereo progress update

A brief review of the present status and direction of AM stereo sets the stage for ensuing discussion. This review will cover the progress in both the broadcast and the receiver arenas.

1.1. Broadcast conversion

Figure 1 shows the U.S. growth in AM stereo stations to the present. Several conclusions may be inferred from the data:

COMMERCIAL AM STEREO STATION PROGRESSION
UNITED STATES



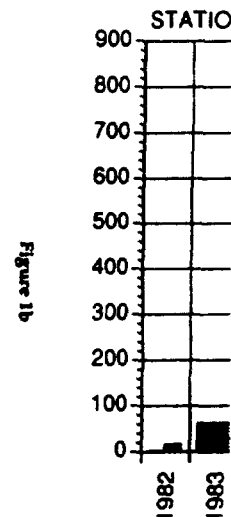
NOTE 1: C-QUAM plot captures C-QUAM pilot compatible Harris stations as of 1986

NOTE 2: Growth rate of stations converting to AM stereo is slowing.

NOTE 3: Ratio of C-QUAM AM stereo stations to other systems is over 95 to 1 and has been increasing.

¹ National Radio Systems Committee.

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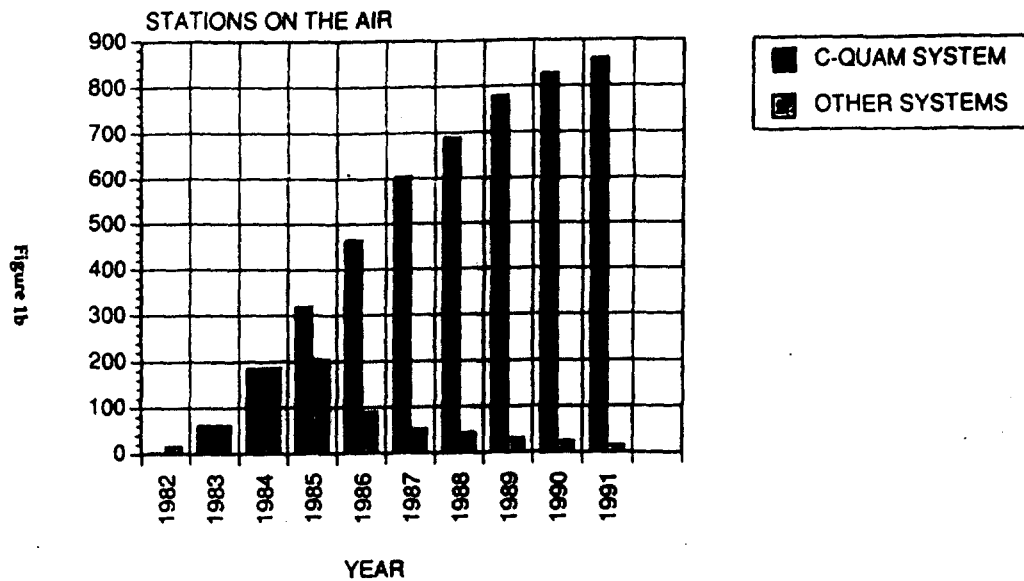
1.2. Receiver

Figure 3 review:
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COMMERCIAL AM STEREO STATION PROGRESS WORLDWIDE



NOTE 1: C-QUAM plot captures C-QUAM pilot tone compatible Harris stations as of 1986

NOTE 2: Growth of stations converting to AM stereo is slowing.

NOTE 3: Ratio of C-QUAM AM stereo stations to other systems is about 95 to 1 and has been increasing.

- Over 95 percent of those who have converted to AM stereo are now using the C-QUAM system. This convergence steadily continues to increase as other systems have receded.

- Approximately 650, or about 20 percent of the U.S. broadcasters have converted to AM Stereo. It has been nearly 10 years since the FCC approved stereo transmission.

The Appendix includes a list of AM stereo broadcast stations. Figure 2, intra, shows that present C-QUAM AM Stereo stations have the potential to reach about 96 percent of the U.S. population.

1.2. Receiver/IC decoder status

Figure 3 reviews the growth of AM Stereo decoders shipped to date. Due to the widespread utilization of "Just in Time" inventories in the receiver industry, the AM Stereo receiver status is nearly the same.

Conclusions that can be drawn from Figure 3 are:

- C-QUAM dominates all other system decoder approaches.
- There are approximately 24 million C-QUAM AM Stereo receivers now.
- The AM stereo receiver population growth rate has slowed.

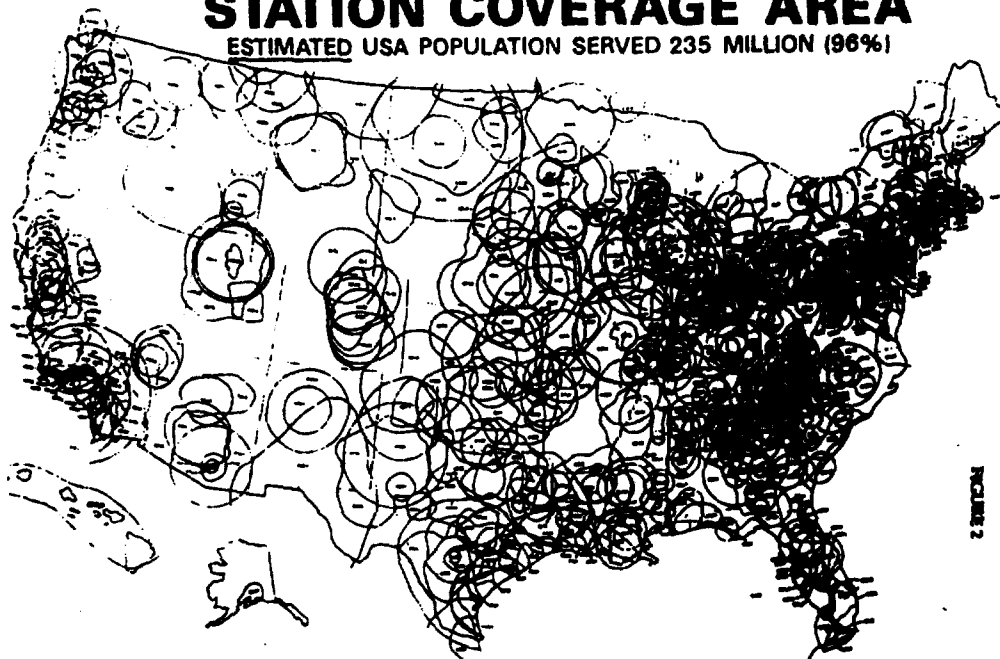
In order to appreciate the receiver status fully, it should be noted that most all of the AM stereo radios manufactured to date have been automobile types. In fact, 15 percent to 20 percent of the new cars sold in the U.S. decode C-QUAM AM Stereo. To date, there has been almost no AM stereo penetration in other types of radio products!!

as of 1986

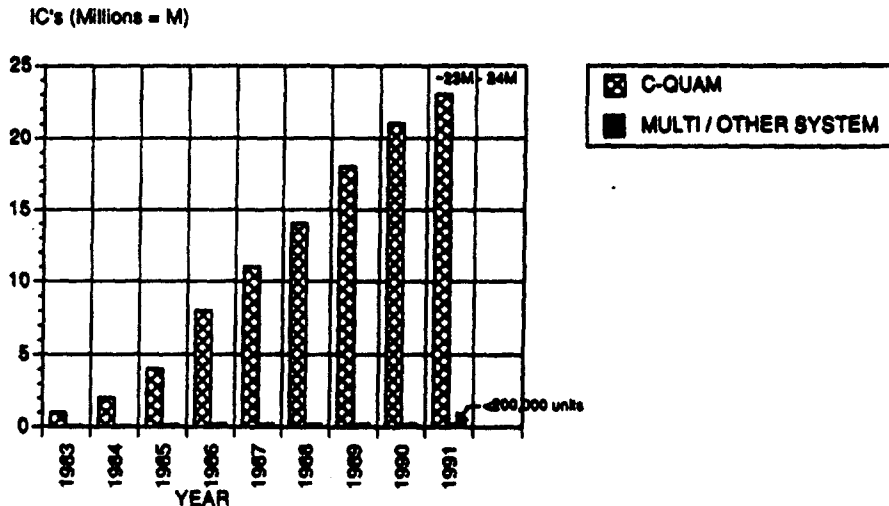
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C-QUAM® AM STEREO STATION COVERAGE AREA

ESTIMATED USA POPULATION SERVED 235 MILLION (96%)



AM STEREO DECODER IC'S SHIPPED



NOTE 1: Graph indicates steady receiver growth.

NOTE 2: Non-C-QUAM receivers, no longer manufactured, are less than 1% of all AM stereo receivers currently in the marketplace.

NOTE 3: The vast majority are auto receivers.

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1.3. Update su:

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- Slow AM stereo impact on AM radio caster conversion. La conversion by broadc

C-QUAM AM STEREO SCORECARD

C-QUAM IS A GROWING WORLDWIDE STANDARD AND U.S. DE FACTO STANDARD - NO OTHER SYSTEM HAS ANY SUCH SUPPORT

STATIONS ON THE AIR:	<u>C-QUAM</u>	<u>OTHERS</u>
WORLDWIDE	865	
UNITED STATES	657	
CANADA	88	
AUSTRALIA	75	
OTHER	47	
WORLDWIDE TOTAL OF STATIONS USING OTHER SYSTEMS)		<20

INTEGRATED CIRCUITS:	<u>C-QUAM</u>	<u>OTHERS</u>
CURRENT C-QUAM IC'S (RECEIVERS) IN MARKETPLACE. (RECEIVER AVAILABILITY IS NEAR 100% OF IC COUNT.)	23 - 24 MILLION	

OTHER OR MULTI-SYSTEM DECODERS	<0.2 MILLION
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WORTHY OF NOTE:

- FIVE OUT OF THE SEVEN #1 RATED AM STATIONS IN THE TOP 10 U.S. MARKETS ARE C-QUAM.
- ABOUT 50% OF TOP AM'S IN THE TOP 100 U.S. MARKETS ARE C-QUAM.

1.3. Update summary and conclusions

The good news is that broadcast stations' conversions and AM stereo receiver quantities continue to grow. In addition, convergence on the C-QUAM system as the de facto standard has been overwhelming. However, the data also reveals disturbing trends:

- Slow broadcaster conversion—According to receiver manufacturers, this impedes receiver production and AM stereo introduction to a wider range of radio types other than auto.
- Slow AM stereo receiver growth—Lack of growth retards AM stereo's beneficial impact on AM radio and has been a serious impediment to a faster rate of broadcaster conversion. Lack of receivers is frequently cited as a primary reason for non-conversion by broadcasters.

EA
96%)



FIGURE 2

OTHER SYSTEM

2. STEREO IS A MOST SIGNIFICANT AM IMPROVEMENT

2.0. Inherent benefits of stereo

Most frequently, after conversion to AM stereo transmissions, broadcasters comment that the station never sounded better, even in monaural reception. This AM stereo by-product occurs because the entire operating chain, from studio to transmitter, has been re-visited in the conversion process. There is a renewed interest and pride associated with "going stereo" and attainment of the good sound associated with stereophonic effects. As a result, more attention is paid to the quality of audio processing, the audio chain, transmitter distortion products, and antenna matching. Thus, even monaural reception is noticeably improved.

Similar improved performance effects occur in AM stereo receiver design. For the first time in years, the radio designers re-visit the entire design and function distribution of RF, IF, decode, and audio of an AM stereo radio. As compared with a typical monaural receiver, the changes usually result in the benefits shown in Table 1.

TABLE 1.—INHERENT ADVANTAGES IN AM RADIO DUE TO STEREO FEATURE ALONE

- 1) Higher Fidelity Receiver manufacturers tend to increase the received bandwidth to take advantage of the stereo ambiance effects of the higher audio frequencies.
- 2) Better RF tracking This is necessary to improve the separation between the channels, but as a consequence, also improves the high frequency distortion performance.
- 3) Lower Overall Distortion—AM Stereo IC's are generally higher performance than standard mono IC's. This is a consequence of achieving good single channel performance.
- 4) Easier Radio Tuning—To maintain good stereo performance on manually tuned radios, AFC is required, thereby making the AM radio easier to tune correctly to a station.
- 5) Better IF Filters—The concern for good stereo sound has resulted in the development of improved IF filter elements.
- 6) Added Design Interest—The competitive stereo feature gives the engineer an awareness and reason to design a better radio.

Note that distortion, frequency response, and ease of tuning are positively impacted. These by-products alone are of significant AM improvement consequence. But these effects are only the beginning of the performance and features improvement potentials due to AM Stereo.

2.1 Additional IC performance pluses in AM Stereo

The addition of an AM Stereo decoder IC, together with new technology, presents a host of other easily attained present and future performance advantages. Table 2 lists some of these advantages that either are already in existing AM Stereo decoders, or could readily be implemented with today's technology.

TABLE 2.—EASILY ATTAINED ADDITIONAL PERFORMANCE PLUSES DUE TO IC DECODER CHARACTERISTICS

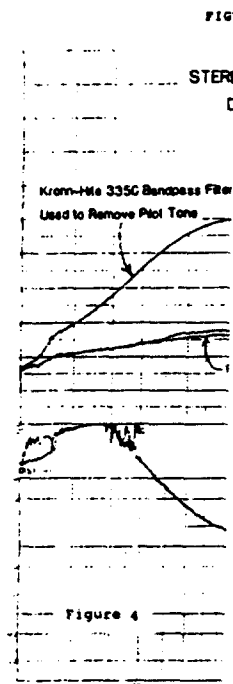
- 1) Synchronous Detection—all present Motorola IC decoders have synchronous detectors that could be utilized.
- 2) Noise and/or Interference Recognition and Discrimination—The In-Phase detector gives an accurate indication of noise or interference. This can be used for:
 - Improved Signal Seek
 - Improved Stereo Seek
 - Blend Effects
 - Automatic Bandwidth Control or Frequency Control.
- 3) Future IC Designs Can Look Forward To:
 - Even Smarter Adaptive Reception Techniques
 - Decreased Function Costs.

2.2. Stereo is

In the early days of row band stereo has Since then, the evolution entertainment products Fi's, analog tapes, ctainment products intend to use stereo that this has become stereo is to accept a

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Figure 4 and Figure to AM Stereo receiver to Japan's MPT AM compensates for NR kHz. This effective designed for the close 30 dB. Figure 5, a 1 AM Stereo bandwidth. Make no mistake these kinds of perfor



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